Topic: Endpoint discontinuities

Question: Which of the following statements is true?

Answer choices:

A The endpoint of an interval is discontinuous for a function because one of the right-hand or left-hand limits will equal zero.

B The endpoint of an interval is discontinuous for a function because one of the right-hand or left-hand limits will equal infinity.

C The endpoint of an interval is discontinuous for a function because one of the right-hand or left-hand limits will not exist.

D The endpoint of an interval is discontinuous for a function because both of the right-hand or left-hand limits will not exist.

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Solution: C

The endpoint of an interval is discontinuous for a function because one of the right-hand or left-hand limits will not exist.

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Topic: Endpoint discontinuities

Question: If the function $f(x) = x^2$ is only defined on $[1,4]$, and does not extend beyond that interval, what are the discontinuities of the function?

Answer choices:

A Endpoint discontinuities at $x = 0, 4$.

B A jump discontinuity at $x = 0$.

C Endpoint discontinuities at $x = 1, 4$ and a jump discontinuity at $x = 0$.

D Endpoint discontinuities at $x = 1, 4$.

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Solution: D

The endpoint of an interval is discontinuous for a function because one of the right-hand or left-hand limits will not exist.

The function $f(x) = x^2$ is a continuous function, but the interval $[1,4]$ means that there will be endpoint discontinuities at $x = 1$ and $x = 4$.

At $x = 1$, only the right-hand limit exists. The left-hand limit would be outside the function's domain. By the definition of continuity (that the left-hand limit exists, the right-hand limit exists, and the left- and right-hand limits are equal), that means the function isn't continuous at $x = 1$, so there is an endpoint discontinuity there.

At $x = 4$, only the left-hand limit exists. The right-hand limit would be outside the function's domain. By the definition of continuity (that the left-hand limit exists, the right-hand limit exists, and the left- and right-hand limits are equal), that means the function isn't continuous at $x = 4$, so there is an endpoint discontinuity there.

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Topic: Endpoint discontinuities

Question: What are the discontinuities for the function on the given interval?

$$f(x) = \sqrt{x}$$

on the interval $[2,5]$

Answer choices:

A Endpoint discontinuities at $x = 2$ and $x = 5$ and when $x \geq 0$.

B Endpoint discontinuities at $x = 2$ and $x = 5$.

C Endpoint discontinuities at $x = 2$ and $x = 5$ and when $x \leq 0$.

D Endpoint discontinuities at $x = 0$ and $x = 5$.

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Solution: B

The endpoint of an interval is discontinuous for a function because one of the right-hand or left-hand limits will not exist.

The function $f(x) = \sqrt{x}$ is a continuous function when $x \geq 0$ but the interval $[2,5]$ means that there will be endpoint discontinuities at the points $x = 2$ and $x = 5$. Since we are only interested in the discontinuities during the interval, only the end points are discontinuities.

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